DOCUMENT RESUME

ED 204 735 CS 006 175

AUTHOR Escoe, Adrienne S.
TITLE Schooling and Schema: From Research in Reading Instruction toward Information Processing.
PUB DATE 81
NOTE 69p.; Paper presented at the Annual Meeting of the International Reading Association (26th, New Orleans, LA, April 27-May 1, 1981).

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS Intermediate Grades; Learning Processes; Learning Theories; *Reading Comprehension; *Reading Instruction; Reading Research; Reading Skills; *Teaching Methods
IDENTIFIERS Schema Theory

ABSTRACT

Prepared as part of a continuing study of the instructional practices that make up the process of schooling, this paper concentrates on the practices that comprise reading comprehension instruction. The paper focuses on four skills commonly taught and assessed as part of many widely used reading comprehension instruction programs in the intermediate grades: (1) determining the main idea and details of written text, (2) understanding sequential information, (3) understanding cause-and-effect relationships, and (4) drawing conclusions. The paper presents a summary of the instructional practices commonly used to achieve student proficiency in each of these skill areas, along with specifications and some example items that schools could use to provide useful diagnostic data. The paper concludes with a sketch of reading comprehension that is observed in instructional practice and that supports an information-processing model (schema theory) of reading comprehension. (FL)

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Schooling and Scheming: From Research in Reading Instruction Toward Information Processing

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Organization of Teacher Educators in Reading

Twenty-sixth Annual Convention of the
International Reading Association

New Orleans: April, 1981

CS006175

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SCHOOLING AND SCHEMING: FROM RESEARCH IN READING INSTRUCTION TOWARD INFORMATION PROCESSING[1]

Adrienne S. Escoe

INTRODUCTION

According to the editors of *Reading Research Quarterly* (Pearson & Samuels, 1980), among practitioners of reading education there appears to be increasing apprehension about the ability of schools to deliver instruction in comprehension. Scores on reading tests in many districts seem to fuel teachers' concern; test scores show a steep slide that begins in the intermediate grades and continues on into the secondary years. School districts have responded by assessing minimal competencies in reading comprehension and attempting to deliver enough remedial instruction to meet students' critical need for comprehension skills so they can function well in a literate society. This paper focuses on several skills commonly taught and assessed as part of several popular and widely-used programs of instruction in reading comprehension in the intermediate grades: determining the main idea and details of written text; understanding sequential information; understanding cause-and-effect relations; and drawing conclusions. A summary is presented of the instructional practices customarily employed to achieve student proficiency in each of these skills, along with specifications and some examples of items that schools could use now to provide useful diagnostic data. The skills are then discussed within a theory of reading comprehension.

For several years, the Southwest Regional Laboratory has studied the instructional practices that make up the process of schooling. As a significant part of this inquiry we have been concerned about the various practices that comprise an important part of reading instruction. For example, we now have analytical data that describe the skills content of major reading textbook series (Fiege-Kollmann, Note 1). These data form a profile of skills that highlight grade-by-grade instruction across series, a profile which is also especially useful in showing how instructional activities for each skill are introduced, concentrated, and maintained across successive years of schooling.

According to the profile of reading instruction, four skill areas of reading comprehension (main idea and details, sequence, cause-and-effect, and drawing conclusions) receive concentrated treatment at about grade five. The analysis in this paper deals with these topics.

The paper presents the four skill areas in terms of strategies and materials for instruction, and in terms of specifications of performance for items that should assist teachers in diagnosing the development of or gaps in an individual's skill attainment. For each of these four skill areas there is:

- a discussion of the general strategy for instruction (e.g., understanding the main idea) as found across existing textbooks;
- examples of assessment items that could be used to identify specific student needs for skill development.

The paper concludes with a sketch of reading comprehension that is observed in instructional practice and that supports an information-processing model of reading comprehension.

MAIN IDEAS, DETAILS

While some written materials don't have a single main idea, most of what is read has at least one central theme or message. It is usually for the support of a main idea that the reader needs to understand details of both narrative and expository materials. These are the important details in the comprehension of a paragraph, or larger unit of discourse, though other details may also be important in some sorts of writing, such as in recipes for food preparation. In the primary and early intermediate grades, this kind of comprehension is important in its own right. Later on, being able to understand the gist or main idea of written material takes on additional significance for students in the intermediate grades and beyond as a first step in interpreting, analyzing, synthesizing, and evaluating what is read. Each of these critical reading skills should be available to students who will soon be required to make sense of complex content area materials in the secondary grades.

In the two sections that follow, main idea and details will be the focus of the discussion in two ways. First we will identify some of the constituent skills that go along with determining the main idea and details of written text, *as suggested by those strategies that are prevalent in instruction.* Then we will present specifications of items that can be used to diagnose competency in the constituent skills.

Instructional Strategies for Understanding the Main Idea in Written Materials

The skill of determining the main idea and details of text is not only taught in major reading series for the intermediate grades but also assessed regularly by tests of reading comprehension at those grades.

For example, a check of four instruments administered to substantial numbers of California school children showed that approximately ten percent of the items included in reading comprehension sections were main idea items.[2] Not all students, however, are successful in responding to this part of the instruments. In fact, results of the 1979 Los Angeles Unified School District's Survey of Progress in Essential Skills indicate that an average of 29 percent of 36,864 students at grade five were unable to correctly identify the main idea of a written selection. A breakdown of scores according to the two main idea items of the survey shows that at least for these particular items, students were less proficient in choosing the main idea when it was expressed as a title (Item 1) than when it was expressed as a statement of the main idea (Item 2).

Item	Number of students = 36,864 % students answering each item correctly
1. identifies title for story	66
2. Answers main idea question about article	75

It is also possible that the nature of the selections and their size may have accounted for the difference in level of difficulty. Item 1 is based upon a narrative single paragraph while item 2 involves expository material of five paragraphs as shown below.

1

Laura was swimming in Harpoon Lake. Suddenly she heard some strange noises. When she looked up, she saw two huge birds flying overhead. She knew that the birds were swans, because they were white and had long, graceful necks. At first she thought that the birds were calling to each other. Then she remembered that these noises were not bird calls. When these birds flap their huge wings, air comes streaming through the feathers. This air makes the noise that Laura heard.

What is the best title for this story?

- ○ Laura Swims in Harpoon Lake
- ○ Swimming Swans
- ○ Singing Birds
- ○ The Swans above Harpoon Lake

2

People have always wanted to see in the dark, and so they have learned to make many kinds of lighting devices.

The first lamp contained animal fat. The fat was melted down and poured into a dish made out of soapstone. A twisted piece of string was used as the wick. One end of the string was soaked in the animal fat. The other end burned and gave off light. These lamps were called stone lamps.

Then candles came into use. Some candles were made out of beeswax. Others were made out of animal fat. Both kinds of candles were made by dipping the wick into hot wax or fat. When the wax or fat cooled, it hardened around the wick. When the candle was lit, the wick burned and gave off light. The light from candles was brighter than the light from stone lamps.

Then people discovered that oil from whales would give good light when it was burned. The oil was put into lanterns. These lanterns gave off more light than candles, and they burned longer. One of the problems with whale oil was that it did not smell good when it burned.

Then petroleum was discovered. It was made into kerosene that could be used in lanterns. Kerosene was better than whale oil. It burned brighter and smelled better than whale oil. This kind of lighting was used until the electric light came into use about one hundred years ago.

What is the main idea of this story?

- ○ Whale oil lanterns give off light.
- ○ Candles are made from beeswax.
- ○ People have developed many different lighting devices.
- ○ A wick is used in soapstone lamps.

While the results of a two-item assessment of proficiency in one skill area should not serve as the basis for recognizing the degree of competency in the skill, the large number of respondents in this instance invites a closer look at the results.

There is little empirical data that supports the notion that a title question format is inherently more difficult for readers to respond to than a direct main idea question format, or that readers have more difficulty understanding the main idea of narrative rather than expository materials, though it *seems* that they are not as likely to have difficulty with expository materials (Escoe, 1981). Less proficient readers may be unable to "see" approximations to what they thought to be the main idea, and may select an incorrect answer choice if their interpretation of the main idea is not represented in a test item almost word for word. As far as text length is concerned, little is known about the relationship between length of written material and comprehensibility. At this point, research is only substantial enough for these questions to be raised, not answered in any way that has clear implications for schools.

On the whole, commercial reading series do not assist teachers in dealing with the issues of question format, nature of material, and text length in their considerations for instruction. Some texts offer teachers guidance in helping students develop strategies for understanding main idea, however a considerable portion of suggested instructional activity is spent on assessment. In fact, a noted reading researcher

found recently that teachers of grade three to six spend practically no class time on instruction in reading comprehension (Durkin, 1978-79) in the sense that the process is explained or definite cues or strategies are taught to readers. Instead, the time is spent on exercise and assessment.[3]

Further, the developers of textbook series seem to consider that instruction in the area of main idea and details largely through practice is appropriate for fifth-graders who are developing other skills according to grade-level expectations. If there is a need for greater emphasis on instruction that would provide less competent students with definite, dependable strategies for understanding the main idea, teachers must go outside the mainstream of grade five materials to satisfy it. A number of students *may* gain skill in understanding the main idea of text merely by responding to practice exercises, although this way of teaching may not be the most efficient for them to learn. But the student who has limited to no prior skill in this area of reading comprehension is stymied; practice alone cannot be expected to help very much. When practice exercises are preceded and/or followed by direct written or oral instruction, the former being common in workbooks and duplicated worksheets of textbook series, the student has a better chance of being successful in learning the skill.

Skills that may be considered constituents of determining the main idea of text are represented in textbook series by several different kinds of instructional activities that seem to fall into these general areas: supporting details, common elements, text structure or organization, statements of main idea, and paraphrase.

The supporting details are extremely important for students to be able to identify, but instruction is so nonspecific in providing guidance for how to go about the task that, as Ekwall (1970) notes, students often get bogged down in minor dates and details. He suggests that the testing often used in schools encourages this type of reading. On rare occasions instructional materials provide students with an understanding of what details are along with a procedure that suggests slow and carefully reading for noting and remembering the most topical ones. Occasionally a program will provide some guidance for teaching students to recognize types of details, but mostly they resort mainly to providing practice activities where students are simply called upon to supply or identify details that support a main idea without much direction or guidance.

Using the common elements of a selection could be a significant part of a strategy for understanding and identifying the main idea, but only a few materials are available for doing anything about it in classroom instruction. Students who can identify the elements common to most or all of the sentences in a selection can more easily compare and integrate information to form a general concept.

Text structure is another aspect of instruction that is intended to help students understand and identify main idea. There is evidence that good paragraph structure, i.e., presence of a topic sentence and coherence, can facilitate a reader's understanding of a written paragraph (Guthrie, 1979). The exercises in most series seem to present well-structured passages to readers. Teachers are urged to screen supplementary materials for good structure, especially for students who are just beginning to gain skill in understanding main idea. Knowledge of text structure or organization can provide the reader with clues to the kind of support that details give to the main idea; for example, where the main idea is proved to be true, where it is clarified or explained, or where it can be concluded logically. Some of the activities that are meant to help students see the structure of written materials are diagramming or outlining a selection. Knowledge of structure can also help readers to identify a main idea if one is stated, or to determine if they need to infer an unstated main idea. Several series give specific instruction for locating stated main ideas and give practice in this skill. Other materials inform students that knowledge of structual devices such as headings can facilitate the comprehension of written materials; one suggests that headings can be misleading.

Identifying or producing statements of main idea seems to be an important goal of most reading series in the intermediate grades, and a lot more guidance is provided for developing this skill. Some textbooks

outline strategies for deriving or identifying a main idea. These strategies may be as limited as "adding up details" or as comprehensive as providing a full sequence of behaviors that can lead to production or identification of an appropriate main idea. Some activities are designed to help students judge the suitability of main idea statements by focusing on the breadth of each statement, or how much content is represented by each. Many instructional materials, however, simply present selections both orally and in writing and require students to identify or produce stated or unstated main ideas, once again reverting to practice without guidance. Sometimes a specific question is asked, such as "What is the third solution to the difficulties of city life?" (Holt, Rinehart & Winston, 1980, p. T-847), thereby providing more fabric for or clues to an appropriate response. The main idea that is identified can take one of several forms including a main idea statement, a central problem, a moral, a title or subtitle, a general description (for example, of a poem), or an illustration that depicts the main idea.

Paraphrase is an aspect of instruction that might facilitate identification of main ideas. Restating a main idea in their own words seems like a good way for students to comprehend the central message of a passage, and recognizing a statement of main idea as a paraphrase is essential to a fair assessment of a student's skill in understanding the main idea. In fact, it is not unusual that the ability to paraphrase authors' main ideas is *the* criterion by which a student's comprehension is judged. However, while teachers' resource materials may recommend instruction in paraphrasing (Heilman, 1977; Pearson, 1978), reading series virtually ignore this skill as a specific and potentially effective strategy for understanding and identifying the main idea of written materials.

But recognition of the inadequacies of instructional materials is not enough. Schools need concrete suggestions for what to do and what is doable. As a direct result of this analytical activity, it has been possible to identify good examples of instructional activities that address each of the skills that have just been discussed. The examples come from several widely-used reading series and supplementary teacher resource guides. While it is not feasible to include in this paper the performance specifications (or objectives) and representative sample activities that were observed in our analysis, these samples are available elsewhere (Escoe, Note 2). However, we have used these samples to develop a series of specifications for diagnostic items, and examples of items, which follow a theoretical model of information processing.

Performance Specifications for Items to Diagnose Comprehension of Main Idea in Written Materials

The instructional activities presented by major reading series in the intermediate grades seem, for the most part, to serve as refresher or maintenance vehicles for the processing of main idea in written materials. As discussed in preceding pages, these activities vary widely in the amount of assistance they provide the reader. Some activities aim to equip the student with processing strategies or parts thereof that ostensibly are generalizable to other reading situations. Many others, however, simply offer practice exercises. For students who have not yet mastered the skill of understanding the main idea, it is unlikely that practice exercises alone will result in much competency. For these youngsters, it is especially important to determine, through reasonable diagnostic procedure, whether and how extensively processing strategies are being used. With information that the reader uses no or partial systematic processing or strategies, instruction can be tailored to suit the absence of any systematic strategy or the existence of specific processing gaps. In other words, a diagnostic procedure can lead to specific instruction--the strategies that are useful in understanding the main idea and ways to confirm that a main idea had been satisfactorily identified--not just more general practice.

A series of diagnostic items for understanding main idea are shown in the next few pages, based on a theoretical model of processing which assumes that a reader can access knowledge about textual forms and some prior knowledge of content. According to the model, the process of understanding the main idea goes something like this: the student--

- 1. reads a passage;
- 2. identifies statements of details;
- 3. identifies key word clusters and phrases that represent the details;
- 4. identifies common elements;
- 5. expresses one or more statements of the common elements;
- 6. compares each statement against key word clusters and phrases, i.e., whether some clusters and phrases are not included in the information of the statement (main idea too small), whether the clusters and phrases correspond to the statement (statement expresses a main idea);
- (7. identifies a paraphrased statement of the main idea in answer to a question).
- (8. locates a stated main idea in a passage).

The seventh step of the process has been included to cover the frequency with which students are required to demonstrate their skill in reading comprehension by means of selecting a (usually) paraphrased statement of the main idea in a multiple-choice item format. Instructional activities, informal periodic assessments, and major reading tests usually include items that present paragraphs along with alternative statements of their main ideas. Recognizing paraphrased expressions is considered a skill that is usually required for the successful identification of a main idea statement.

For passages where the main idea is stated, as it often is in the first sentence of a written paragraph, diagnostic procedures should include a task of location, that is, finding the main idea that is already stated. Students can then treat the "found" main idea as a test-response and can apply steps 1-7 to this statement.

The model of processing for understanding main idea can be extended to instruction. There are a number of points within a sequence, where specific instructional activities are suggested for those students who are unsuccessful in understanding the main idea of a written passage. These activities should reflect segments of the processing model. For example, if it is found that a student cannot identify statements of details in a written passage (#2), she or he may benefit from working first with detailed photographs or other illustrations. Instruction that uses the concrete situation of a picture may succeed for this part of the strategy, whereas words alone, especially with a non-specific practice exercise, may not help. As another example, if a student seems to be able to understand the main idea but fails at selecting an appropriate statement of the main idea, the teacher can provide specific instruction in paraphrasing (Sullivan, 1978; Escoe, 1981).

Sample items. Assuming the process occurs as it is stated above, items such as the following can be developed to determine where the student has or has not achieved proficiency.*

- 1. (reads a passage.)
- 2. identifies statements of details.

*Items can be developed for either oral or written presentation and response, and with various performance modes such as multiple-choice, completion, open-response question.

Performance specifications: Given a passage written at [a student's] independent reading level, identify detail sentences.

Examples:

Read the following paragraph.

> One of America's smartest animals is the woodchuck. Found in most states east of the Rocky Mountains, the woodchuck can easily get its favorite vegetables in the open fields. The furry woodchuck will stand very straight and look like a tree trunk whenever it wants to hide from humans. Even if a farmer builds a fence, the woodchuck will climb over it. If there is a very high fence, the wood chuck will dig under it. It's no wonder that farmers call this smart little animal their biggest troublemaker.

Some of the sentences in the paragraph above tell about the details. Put a line under each sentence that tells about the details.

• 3. Identifies key word clusters and phrases that represent the details.

Performance specifications: Given detail sentences, identify key word clusters and phrases.

Example:

Look at the following detail sentences from a paragraph. Under each sentence write what is most important about each sentence. The first detail sentence is already done for you.

Found in most states east of the Rocky Mountains, the woodchuck can easily get his favorite vegetables in the open fields.

Woodchuck east of Rocky Mountains, gets vegetables in open fields.

The furry woodchuck will stand very straight and look like a tree trunk whenever it wants to hide from humans.

Even if a farmer builds a fence, the woodchuck will climb over it.

If there is a very high fence, the woodchuck will dig under it.

• 4. Identifies common elements.

Performance specifications: Given key word clusters and phrases, identify common elements.

Example:

Look at the following ideas that are most important about the detail sentences. Then write those ideas that seem to be talked about over and over. The first one is already done.

woodchucks east of Rocky Mountains

gets vegetables in open fields

woodchuck stands straight

looks like tree trunk when it hides from humans

woodchuck climbs over farmer's fence

woodchuck digs under high fence

Woodchucks

• 5. Expresses one or more statements of the common elements.

Performance specifications: Given common elements, identify a statement(s) that describes them (main idea).

Example:

Look at the following ideas that are talked about over and over. Write a sentence that tells all about these ideas.

Woodchucks does smart things to get vegetables outsmarts farmer

• 6. Compares each statement against key word clusters and phrases.

Performance specifications: Given key word clusters and phrases and a statement(s) of the main idea, identify the breadth of the statement.

Example:

Look at the following ideas that are most important about the detail sentences.

woodchucks east of Rocky Mountains

gets vegetables in open fields

woodchuck stands straight

looks like tree trunk when it hides from humans

woodchuck climbs over farmer's fence

woodchuck digs under high fences

Now here is a sentence that is supposed to tell about the paragraph. It's supposed to be the main idea of the paragraph. Read the sentence in the box and choose the answer that tells about the sentence in the box.

There are many kinds of animals that are smart enough to get free fruit and vegetables to eat.

A. The sentence doesn't tell enough about the most important ideas of the paragraph. It's not the main idea of the paragraph.

B. The sentence tells more information than what is given by the most important ideas of the paragraph. It's not the main idea of the paragraph.

C. The sentence tells just about the most important ideas of the paragraph. It is the main idea of the paragraph.

Woodchucks live east of the Rocky Mountains, where they are very good at climbing fences.

A. The sentence doesn't tell enough about the most important ideas of the paragraph. It's not the main idea of the paragraph.

B. The sentence tells more information than what is given by the most important ideas of the paragraph. It's not the main idea of the paragraph.

C. The sentence tells just about the most important ideas of the paragraph. It is the main idea of the paragraph.

Woodchucks are one of the smartest animals in America.

A. The sentence doesn't tell enough about the most important ideas of the paragraph. It's not the main idea of the paragraph.

B. The sentence tells more information than what is given by the most important ideas of the paragraph. It's not the main idea of the paragraph.

C. The sentence tells just about the most important ideas of the paragraph. It is the main idea of the paragraph.

• (7. Identifies a paraphrased statement of the main idea in answer to a question.)

Performance specifications: Given a main idea, identify its paraphrase.

Example:

Look at the sentence in the box. It is the main idea of the paragraph.

One of the smartest animals in America is the woodchuck.

Now choose a main idea sentence which means the same or nearly the same as the main idea sentence in the box.

A. Woodchucks are one of the smartest animals in America.

B. Smart woodchucks climb fences in America.

C. One of America's animals is the woodchuck.

• (8. Locates a stated main idea in a passage.)

Performance specifications: Given a paragraph with a stated main idea, identify the position of the stated main idea.

Example:

Read the paragraph and answer the question.

One of the smartest animals in America is the woodchuck. Found in most states east of the Rocky Mountains, the woodchuck can easily get his favorite vegetables in the open fields. The furry woodchuck will stand very straight and look like a tree trunk whenever it wants to hide from humans. Even if a farmer builds a fence, the woodchuck will climb over it. If there is a very high fence, the woodchuck will dig under it.

In the paragraph above, where is the sentence that states the main idea?

A. at the beginning

B. in the middle

C. at the end

SEQUENCE

Almost all reading textbook series at the fifth-grade level emphasize the skill of understanding sequence (Fiege-Kollmann, Note 1). In fact, many students are exposed to sequential ordering of narratives earlier in their lives, most often in the form of listening to fairy tales and later reading narratives independently. As youngsters reach the intermediate grades, being able to understand the temporal organization of both narrative and expository text assumes tremendous importance in their success at comprehending what they read and in demonstrating that accomplishment. Sequencing skill begins to carry additional significance for students at the intermediate-grade level who are increasingly involved in activities where following written directions in a specified sequence becomes essential for school and other activities (e.g., scientific experimentation, sewing, cooking, home repair/electronics, music). Also, students in the intermediate grades will soon be required to make sense of complex materials in the social sciences which invariably require skill in understanding sequences of events. The skills that contribute to students' understanding of sequential information will be discussed in two sections that follow: strategies for instruction and specifications for diagnostic items.

Instructional Strategies for Understanding Sequence in Written Materials

While students in the intermediate grades do not, on the whole, seem to have as much difficulty understanding sequence in written materials as they do understanding the main idea, there appears to be a sizeable number of them who have not yet demonstrated this competency at the end

of grade 5 or 6. For example, a survey of essential literacy skills that was administered to almost 37,000 fifth-graders in May 1979 indicated that 81 percent of them responded correctly to items that assessed the comprehension of sequence in sentences (items 2, 3, and 4 to follow this discussion), while 71 percent responded correctly to the same skill area applied to an article (item 1). That means of course that at least 7,000 and possibly as many as 10,000 fifth-graders were not able to understand very well some of the materials they read. Sequence items are common in most assessments of reading comprehension,[4] and therefore, form an important and identifiable (although not always identified) component of any appraisal of how well students comprehend what they read.

A breakdown of scores indicates that out of four sequence items at the fifth-grade level of the survey noted above, the one item that involved a longer unit of language (item 1) was more difficult for students than the three items that involved single sentences (items 2, 3, and 4).

Number of students = 36,864

Item	% students answering each item correctly
1. Answers sequence question about article	71
2. Answers sequence question about sentence	81
3. Answers sequence question about sentence	80
4. Answers sequence question about sentence	81

It is possible that the fact that the article presented the reader with many more details contributed to the increased difficulty of item 1 (below). Also the information that provides the answer for this item (*stone lamp*) appears only once in the second paragraph and then is mentioned in comparison with another answer choice in that same paragraph (*The light from candles was brighter than the light from stone lamps.*). Items 1-4, discussed above, follow.

---

1. People have always wanted to see in the dark, and so they have learned to make many kinds of lighting devices.

   The first lamp contained animal fat. The fat was melted down and poured into a dish made out of soapstone. A twisted piece of string was used as the wick. One end of the string was soaked in the animal fat. The other end burned and gave off light. These lamps were called stone lamps.

   Then candles came into use. Some candles were made out of beeswax. Others were made out of animal fat. Both kinds of candles were made by dipping the wick into hot wax or fat. When the wax or fat cooled, it hardened around the wick. When the candle was lit, the wick burned and gave off light. The light from candles was brighter than the light from stone lamps.

   Then people discovered that oil from whales would give good light when it was burned. The oil was put into lanterns. These lanterns gave off more light than candles, and they burned longer. One of the problems with whale oil was that it did not smell good when it burned.

   Then petroleum was discovered. It was made into kerosene that could be used in lanterns. Kerosene was better than whale oil. It burned brighter and smelled better than whale oil. This kind of lighting was used until the electric light came into use about one hundred years ago.

   What kind of lighting was used first?

   - ○ a stone lamp
   - ○ a lantern
   - ○ a candle
   - ○ an electric light

2. After gold was discovered, many people moved to California.

   What happened first?

   - ○ Many people moved to California.
   - ○ Gold was discovered.

3. Frank found a nugget in his gold mine while he was fixing his cart.

   When did Frank find the nugget?

   - ○ after he fixed his cart
   - ○ before he fixed his cart
   - ○ as he was fixing his cart

4. When Henry saw all of Frank's gold, he decided that he wanted a gold mine of his own.

   What did Henry want after he saw Frank's gold?

   - ○ Henry wanted Frank's mine.
   - ○ Henry wanted Frank's gold.
   - ○ Henry wanted his own mine.

Materials that are widely-available for reading instruction, in almost every case, do not assist teachers in considerations of the length of units of written language or their content. In addition, those materials generally do not deal with the structure of text. For example, there is solid research that demonstrates that comprehension is facilitated when a narrative text follows an expected or logically ordered sequence (Stein, 1978). Further, if a narrative contains temporal inversions (references to events that are out of the sequence of occurrence), the sequence is understood better for fifth-graders when the inversions are marked (e.g., *This happened because . . .*) (Stein, 1978). Instructional materials offer teachers little direct assistance for helping students understand sequential information, other than directions for teaching about temporal clue words. Most of the material concerning sequence is in the form of practice exercises. Practice exercises alone may help some students to master a skill of reading comprehension, but direct instruction, ideally followed and maintained by practice, should deliver mastery more systematically and with greater efficiency. Instructional activities intended for the development of skill in understanding sequential information seem to fall into four general areas: knowledge of sequential content and structure (such as times of day and expected sequence of a particular text form), sequence markers (clue words or phrases such as *after* and *in the beginning*), indication of temporal order (e.g., numbering of text events and topics), and following written directions to create a product (e.g., food) or to perform some action (e.g., hitting a baseball).

Activities that provide practice in applying knowledge of sequential content and structure are usually presented without specific instructional strategies. One series offers a reason for the logical sequence of events in fantasy discourse, and then provides practice in ordering a familiar fairy tale. The same series gives practice in inferring the sequence of a story whose theme is identifiable by most intermediate-graders. Another series requires students to infer the sequence of a nature story, however this one specifically encourages students to apply prior knowledge. Finally there is an activity that presupposes knowledge of time of day by posing a specific question, the answer to which must be inferred. For successful practice, all of the foregoing activities seem to require readers to reflect upon particular situations in text, compare them to what they've experienced before, and then infer a sequence to respond to an exercise.

Sequence markers are the second area of instructional activities discussed here. A number of resource books and fifth-grade reading texts provide instruction and practice for recognizing words or phrases that can help readers understand the sequence of events. In this area, virtually all of the materials analyzed for this paper provide instruction and not just practice alone.

The third area of instructional activities is the indication of temporal order. Most material in this area appears as practice exercises where readers are required to number text events, topics, or problems, or rearrange them through recall or location, or supply missing text elements or characters, again from memory or with the text stimulus available.

Some practice involves temporal ordering plus writing summary paragraphs, combining summary sentences, or describing the roles of particular objects in a story.

A final area of activities for teaching the comprehension of sequential information is following directions. One textbook that was examined requires the reader to *execute* directions which are specified, and this is to be done after some instruction is provided for following those directions. The same textbook also presents specific questions about illustrations that are based upon previous written directions. Other activities offer a description of a procedure which is followed by a purposefully misarranged list of steps to be numbered in the correct sequence of the procedure.

Sample activities described here are not detailed in this paper, but like those for the area of main idea and details, activities for instruction in comprehending sequential information are available elsewhere (Escoe, Note 2). However, we present here a series of specifications for diagnostic items and examples of these items on the following pages. These specifications and items are based on a theoretical model of information processing.

Performance Specifications for Items to Diagnose the Understanding of Sequence in Written Materials

If a student is unsuccessful in understanding sequence in written materials, especially if she or he fails to achieve at least minimal proficiency in this area of reading comprehension, then it becomes necessary to examine the breakdowns or gaps in the student's processing of sequential information. In order to diagnose these problem points, a model of a well-functioning process has to be assumed, at least until further investigation advises that the process is actually different from what is presumed here. A model for processing sequential information in written materials assumes three aspects of a student's prior knowledge: 1) awareness of temporal order, such as time of day, seasons of the year, serial arrangement of common procedures; 2) familiarity with a variety of literary forms, such as fairy tales, articles, poetry, recipes, and the like; and 3) awareness of the more common types of sequences markers, such as the words *first, last, while* and others. Teachers can find out in several ways if the first assumption is met. They can present the student with incomplete series of temporal concepts, and ask students to provide missing information, or they can ask students to describe a common procedure (to note their skill in relating a fairly regular sequence), for example:

morning, noon, _____

breakfast, _____, supper

Sunday, Monday, _____, Wednesday, . . .

_____, February, March, . . .

winter, spring, summer, _____

How do you cook spaghetti?

What do you do when you take a shower?

The second assumption can be tested very simply by asking the student if she or he knows what a fairy tale is. It may be necessary to give an example, such as *Snow White and the Seven Dwarfs* or *Little Red Riding Hood*, and then ask if the student knows any others. The same informal questioning strategy can be applied to other literary forms. The last assumption can be met by presenting the student with a short text that includes common sequence markers, and asking about their function, for example:

First Lucy shut the door. Then she sat down on the sofa. Finally she took off her tight new shoes.

Why do you think the word *first* is put here?

What does *finally* mean?

The process of understanding sequential information in written materials appears to go something like this: the student--

- 1. reads a selection which is temporally organized;
- 2. [where present] identifies sequence markers (words or phrases which indicate sequence);
- 3. identifies a possible temporal sequence of events;
- 4. tests the sequence and confirms that it makes sense according to the content of the selection and [the reader's] general knowledge of content and structure;
- (5. [for following directions] executes the specified directions).

Clearly, different sorts of written materials may require greater or fewer steps of processing, e.g., some materials do not include sequence markers, while others necessitate the creation of a product or other nonverbal procedure. It is suggested that the best way to diagnose skill in following directions is to require the student to execute the directions wherever possible (paper folding, gameboard maneuvering, and other procedures might be more feasible than food preparation in some classrooms).

Sample items. Assuming the process occurs as it is sketched above, items such as the following can be developed to determine where the student has or has not achieved proficiency.*

- 1. Reads a selection which is temporally organized.
- 2. [where present] identifies sequence markers.

Performance specifications: Given a temporally-organized selection that is written at [a student's] independent reading level, identify a sequence marker.

Examples:

a.

First Shirley and Tom gave fresh water to their thirsty new puppy, and then they brought the groceries into the house. They put the cold food in the refrigerator and the rest of the groceries into the cupboard. Then Tom turned on the fan to cool off the kitchen. Tom reached for the tallest glasses on the shelf as Shirley took out the pitcher of chocolate milk.

There is a word in the story that tells you that Shirley and Tom gave water to the puppy in the beginning. Look at the following sentences from the story to find the word.

First Shirley and Tom gave water to their thirsty new puppy, and then they brought the groceries into the house.

Draw a circle around the word in the sentence that tells you that Shirley and Tom gave water to the puppy in the beginning of the story.

There is a word in the story that tells you that Shirley took out the pitcher of chocolate milk at the same time that Tom reached for the glasses on the shelf. Look at the following sentence from the story to find the word.

Then Tom reached for the tallest glasses on the shelf as Shirley took out the pitcher of chocolate milk.

Draw a circle around the word in the sentence that tells you that Shirley took out the pitcher of chocolate milk at the same time that Tom reached for the glasses on the shelf.

b.

Pudding

1 box instant pudding mix
2 cups cold milk

Directions:

Empty pudding mix into a mixing bowl. Add milk. Mix well with a spoon. Beat with a beater for two minutes. Pour into four small dishes. Chill in refrigerator for one hour.

There is a word in the directions that tells you to put in the milk after you empty the pudding mix into the bowl. Look at the following sentences from the directions to find the word.

Empty pudding mix into a mixing bowl. Add milk. Mix well with a spoon.

Draw a circle around the word in the sentences that tells you to put in the milk after you empty the pudding mix into the bowl.

*Items can be developed for either oral or written presentation and response, and with various performance modes such as multiple-choice, completion, open-response question.

• 3. Identifies a possible temporal sequence of events.

Performance specifications: Given a selection, identify sequence of events.

Examples:

a. (Refer to 2a above.)

What did Shirley and Tom do first?

A. They sat down and drank chocolate milk.

B. They gave fresh water to the puppy.

C. They put some food in the refrigerator.

When did Shirley take out the chocolate milk?

A. before Tom turned on the fan

B. at the same time Tom reached for the glasses

C. while Tom brought the groceries in the house

b. (Refer to 2b above.)

When do you put in the milk?

A. before you empty the pudding mix into the bowl

B. at the same time you empty the pudding mix into the bowl

C. after you empty the pudding mix into the bowl

• 4. Tests the sequence and confirms that it makes sense.

Performance specifications: Given a selection, respond to questions that require application of prior knowledge and content.

Examples:

a. (Refer to 2a above)

Why do you think that the first thing Shirley and Tom did was to give water to the puppy?

A. because puppies can't put away the groceries

B. because puppies need to have water when they are thirsty

C. because puppies like to be near fans to cool off

Which sentence do you think belongs at the end of the story?

A. Finally, Shirley and Tom sat down and drank the chocolate milk.

B. Before Shirley and Tom gave water to the puppy, they ate some cookies.

C. While Tom turned on the fan, Shirley put the cold food in the refrigerator.

b. (Refer to 2b above.)

Why do you think the pudding mix and the milk are mixed with a spoon before they are mixed with a beater?

A. because the spoon is easier to use than the beater

B. because the beater is too big to put in the mixing bowl or the small dishes

C. because the beater might splash the milk at first

Which sentence do you think belongs at the end of the directions for making pudding?

A. Pour milk into a mixing bowl.

B. This will make four half-cup servings.

C. Open one box of pudding mix.

• (5. [For following directions] Executes the specified directions.)

Performance specifications: Given the directions for a procedure, and specified equipment and items, execute the directions.

Example:

(Refer to 2b above.)

Read the directions on the box and make four half-cup servings of pudding.

CAUSE AND EFFECT

Helping students to understand causal relations may be the most important aspect of comprehension instruction simply because present-day society is preoccupied with a search for causes. Professionals and tradespeople alike seem to be motivated to find the origin or "real cause" of a particular behavior or event. Similarly, the *reading* required of and pursued by these and other participants in society, i.e., vocational, informational, and recreational matter, reflects a preoccupation with causality and finds its way down into materials written for intermediate-grade students in basal texts as well as in content-area publications and trade books. Further, items that assess the understanding of cause-and-effect relations in text appear regularly among tests of reading comprehension. A check of four instruments that are used by large numbers of California school children showed that from 7 to 17 percent of the items included in reading comprehension sections were cause-and-effect items.[5]

Instructional Strategies for Understanding Cause-and-Effect Relations in Written Materials

The understanding of cause-and-effect relations in text for intermediate-grade students seems to be just fair. It appears that many students have not yet demonstrated this competency at the end of the fifth grade. A survey of essential literacy skills that was administered to nearly 37,000 fifth-graders in May 1979 indicated that an average of about 73 percent of the students responded correctly to three items that

assessed the comprehension of cause-and-effect. This percentage represents the most difficult area of reading comprehension, except for main idea, among the four areas discussed in this paper (main idea, sequence, cause and effect, and drawing conclusions). Since assessments of reading comprehension at the fifth-grade level generally include some items that require an understanding of cause-and-effect relations in text, fifth-graders' comprehension of what they read is likely to be measured in part by cause-and-effect items, even if cause and effect is not identified as a test component.

A breakdown of scores (following) indicates that each of the survey items was approximately equal in difficulty, even though two of the items were based on a one-paragraph story (items 1 and 2), and the third on a letter (item 3).

Number of students = 36,864

Item	% of students answering each item correctly
1. Answers cause-effect question about story	71
2. Answers cause-effect question about story	73
3. Answers cause-effect question about letter	74

A possible explanation for the consistency in difficulty level across the three items is that in each item the effect is given, and the cause is to be selected. Also in each item the presence of a cause-effect marker may aid comprehension of the relations: in items 1 and 2, *because* is used; in item 3, *when* gives a partial clue to the cause-effect relations.

In addition, the text unit for each item provides the same structural direction, i.e., effect-to-cause, although for item 3 the text is multi-directional, i.e., effect-to-cause and back to effect again. The contribution of the latter two factors to the difficulty level are noted by Humes (1978). The items follow.

Read the story. Answer the questions.

Laura was swimming in Harpoon Lake. Suddenly she heard some strange noises. When she looked up, she saw two huge birds flying overhead. She knew that the birds were swans, because they were white and had long, graceful necks. At first she thought that the birds were calling to each other. Then she remembered that these noises were not bird calls. When these birds flap their huge wings, air comes streaming through the feathers. This air makes the noise that Laura heard.

1. How did Laura know that the birds were swans?

   - She saw their long, graceful wings.
   - She saw their webbed feet.
   - She saw their color and their long, graceful necks.
   - She saw how they swam.

2. Swans make a strange noise. How do they make this noise?

   - The sound comes from their throats.
   - The sound is made by their feet.
   - The sound is made by air coming through the feathers.
   - The sound is made by splashing water.

Henry wrote to his friend, Carlos. Read his letter. Then answer the questions.

Dear Carlos,

Thank you for your letter. I was sorry to hear that you had not been able to find work in Campos. I was glad to read that you would like to work in the mines. I do have some good news for you because I have staked out a gold mine. It is an excellent mine. I have already found a lot of gold there. I need a partner because I can't do all the work by myself. You would be just the right partner for me. Please come and join me as soon as you can.

See you soon,

Henry

3. Why does Henry need a partner?

   - He wants to go to Campos.
   - He has too much work.
   - He hasn't found any gold yet.
   - He doesn't have enough money.

Most instructional materials provide little more than practice exercises. The most notable exceptions are activities that motivate students to learn the skill of understanding cause and effect and those that give specific instruction in general strategies and in the use of cause-and-effect markers. The instructional activities seem to fall into three general areas: motivation, markers (clue words such as *because, since*), and identification of cause and/or effect.

The first two areas, motivation and recognition of clue words, are found rarely in instructional materials. One textbook suggests that students learn that understanding cause-and-effect relations can help in the recall of sequentially-ordered details, and some reading series provide direct instruction in the use of words that signal cause-and-effect relations.

The third general area of instructional activities, direct practice in identifying cause-effect relations in text, is also the largest. In most activities that require identification of cause and/or effect, the student is given a unit of text (most often a single sentence) that specifies or suggests a cause-and-effect relationship, and then he or she is asked to identify either the cause or the effect or both. Often, either the cause or the effect is provided and the student must supply (by recall, recognition, or inference) the other. Matching cause with effects is a variation of these exercises. Several series provide specific questions, usually beginning with "Why . . . [effect]," where the answer the student is supposed to provide amounts to identifying the cause. Other specific questions ask for effects. One textbook precedes specific questions with direct experience (e.g., a balloon that is

punctured), and then illustrations. Determining whether a sentence expresses a cause-and-effect relationship *at all* was the objective of an activity in one textbook, but not any of the others. Occasionally, activities can be found which attempt to broaden the student's understanding of cause-and-effect relations through various extensions, e.g., counting the causes responsible for one effect, and identifying the direction of the cause-and-effect relationship in a sentence.

Performance specifications and sample instructional activities are provided elsewhere (Escoe, Note 2). On the pages that follow are specifications and samples of diagnostic items for understanding cause-and-effect relations in text. These, like in the other areas of reading comprehension, follow a model of information processing.

Performance Specifications for Items to Diagnose Comprehension of Cause-and-Effect Relations in Written Materials

Students who seem to be unsuccessful in understanding cause-and-effect relations that are expressed or implied in text, as determined by informal observation to formal surveys, should benefit from a skill-diagnosis that will locate the specific points of difficulty in their processing of cause-and-effect information. Such a diagnosis can yield information that the reader uses no systematic strategy or an incomplete one when she or he encounters cause-and-effect relations in print. The information, in turn, can serve as a basis for planning specific instruction that can remedy a student's failure to apply effective processing strategies or can provide instruction to fill in learning gaps.

A series of diagnostic items for understanding cause and effect has been structured upon a model of processing of causal information in text. Specifications for the items assume that a reader can access some prior knowledge of a rational base (cause) for what is observed (effect), and is aware of common markers of cause-and-effect relations, such as the words *because, since, as, as a result of, so,* and *therefore*.

Teachers can find out if a student has some prior knowledge of a rational base for what is observed. They can present the student with an illustration of a dramatic effect (or present them with a verbal description of the same), such as a person falling on an icy sidewalk, a child laughing at a clown, and so on. After the student is asked to respond to a question of causality (typically a "why" question), the response can be evaluated in terms of logical cause(s), for example,

Why did the boy fall?

[Because the sidewalk was slippery.]
or
[There was ice on the sidewalk.]

The second assumption can be met by presenting the student with a sentence or paragraph that includes common cause-and-effect markers, and then asking about their function, for example:

The bus broke down, so I was late for school.

Why do you think the word *so* is put here?

What other word means the same as *so*?

The process of understanding cause-and-effect relations seems to go something like this: The student--

- 1. reads a passage which includes cause-and-effect information;
- 2. [where present] identifies cause-and-effect markers (words or phrases which signal cause-and-effect relations);
- 3. identifies cause(s) and effect(s);
- 4. tests the cause(s) against the effect(s) and confirms that they make sense according to the content of the passage and [the reader's] general knowledge of content and cause-and-effect structure in text;
- (5. identifies common question forms that require cause-and effect information for responding).

The foregoing model includes some processing steps which may not be applicable to some materials written for intermediate-grade students. For instance, cause-and-effect relations are not always signaled by a marker such as *because*. Often passages provide an effect and one or more causes and do not express explicitly a cause-and-effect relationship. In this case, readers must be able to infer the relationship.

Other materials may be in the form of assessment items or practice exercises, the latter usually indistinguishable form the former in terms of structure. Some of these materials require readers to respond to a specific question that concerns a cause or an effect, for example:

> Why did Aaron return the basketball to the store?

In this case it is important for the reader to know that this sort of a question typically requires a cause for a response. The reader should be able to recognize that the body of the question expresses an effect, for example:

> Aaron returned the basketball to the store.

Sample items. Assuming the process occurs as it is sketched above, items such as the following can be developed to determine where the student has or has not achieved proficiency.*

- 1. Reads a passage which includes cause-and-effect information.
- 2. [where present] identifies cause-and-effect markers.

Performance specifications: Given a selection that includes causal relations, identify a cause-and-effect marker.

Example:

George and Patty were tired of playing ball. They were tired of riding their bicycles. They were looking for something else to do.

As soon as they put their bicycles away, Patty spotted some old fishing poles. Patty said excitedly, "let's go fishing." George told her that it was a wonderful idea, since George hadn't gone fishing in a long time. "We can go to the pond," he said.

George asked his mother for some cheese, because George and Patty wanted to use the cheese as bait for the fish. Patty carried the two fishing poles. George carried the cheese and an old bucket to bring home the fish in. They walked to the pond, which was only a few blocks away.

After two hours, George and Patty came home. The old bucket was empty, but some of the cheese was still left. Instead of fish for lunch, George and Patty ate cheese sandwiches.

There is a word in the story above that lets you know that what's coming next is the reason that George asked his mother for some cheese. Look at the following sentence from the story to find the word.

George asked his mother for some cheese, because George and Patty wanted to use the cheese as bait for the fish.

Draw a circle around the word in the sentence that lets you know that what's coming next is the reason that George asked his mother for some cheese.

There is another word in the story that lets you know that what's coming next is a reason. Look at the following sentence from the story to find the word that comes before a reason.

George thought it was a wonderful idea, since he hadn't gone fishing in a long time.

Draw a circle around the word in the sentence that lets you know that what's coming next is the reason that George thought fishing was a wonderful idea.

*Items can be developed for either oral or written presentation and response, and with various performance modes such as multiple-choice, completion, open-response question.

• 3. Identifies cause(s) and effect(s)

Performance specifications: Given a selection, identify the causes and effects.

Examples:

(Refer to 2 above.)

Sometimes you read about something that happens. Sometimes you read about the reason it happens.

Look at the following sentence.

George asked his mother for some cheese, because George and Patty wanted to use the cheese as bait for the fish.

Something that happens is George asked his mother for some cheese. *The reason is* _____

_____

_____

Look at the following sentence.

George told her that it was a wonderful idea, since George hadn't gone fishing in a long time.

The reason something happens in the sentence above is George hadn't gone fishing in a long time. *The something that happens is* _____

_____

_____.

Why did George ask his mother for some cheese?

A. George and Patty wanted to use it for bait.
B. George was hungry for lunch.
C. George was going to fix lunch.

Why did George tell Patty that fishing was a wonderful idea?

A. George wanted to use the cheese as bait.
B. George wanted to ride his bicycle to the pond.
C. George hadn't gone fishing in a long while.

• 4. Tests the cause(s) against the effect(s) and confirms that they make sense.

Performance specifications: Given a selection, respond to questions that require application of prior knowledge and content.

Examples:

(Refer to 2 above.)

Why do you think a child might ask his mother for food to use as fishing bait?

[Look for a logical explanation, such as: *because she or he has to ask permission to take food, or because her or his mother might need the food for lunch (or dinner), or because her or his mother knows how to wrap the food to take it out.*]

Why did George ask his mother for some cheese?

A. George and Patty wanted to use it for bait.
B. George was hungry for lunch.
C. George was going to fix lunch.

How do you think a child might feel if she or he hadn't gone fishing in a long time and if the child suggested going to a pond to fish?

_____

_____

[Look for a logical response(s), such as *glad to go*, or *missing going fishing*, or *eager to go.*]

Why did George tell Patty that fishing was a wonderful idea?

A. George wanted to use the cheese as bait.
B. George wanted to ride his bicycle to the pond.
C. George hadn't gone fishing in a long while.

• (5. Identifies common question forms that require cause-and-effect information.)

Performance specifications: Given a selection, and questions based upon it, identify a question that requires cause-and-effect information.

Examples:

(Refer to 2 above.)

Look at the following question. Think about what kind of an answer is needed. Choose the kind of answer that is needed.

Why did George tell Patty that going fishing was a wonderful idea?

The answer to the question above is _____

A. a reason
B. not a reason

Look at the following question. Choose the kind of answer that is needed.

What did George and Patty eat for lunch?

The answer to the question above is _____

A. a reason
B. not a reason

DRAWING CONCLUSIONS

Being able to draw logical conclusions about what is read is a skill that is highly emphasized in almost all series of reading texts at the intermediate-grade level (Fiege-Kollmann, Note 1) as well as in most assessments of reading comprehension.[6] Teaching occurs under a variety of descriptors, including "making inferences," "making judgments," and "predicting outcomes." Some of the same processes readers use in drawing conclusions are also used in understanding main ideas, details, sequential information, and cause-and-effect relations when these are not expressed explicitly in print. As reading materials require more and more interpretive comprehension, and they generally do as students move into more advanced grades, the skill of being able to draw conclusions increases in applicability to reading situations.

Instructional Strategies for Drawing Conclusions in Written Materials

Drawing conclusions is one of several skill areas in reading that requires special emphasis upon thoughtful reading or thinking along with and beyond what is detailed in print. In drawing conclusions, proficient readers seem to note textual information, adjust and reconcile this data with their own experiences and knowledge, and then infer or predict what is not explicitly stated. Unlike the skills required for understanding sequential information and cause-and-effect relations, drawing conclusions does not usually involve text that includes specialized word signals or clues to structure. Units of written language from which conclusions are to be drawn vary greatly in structure or form. There is no simple word

that allows the reader to decide that a particular concept can be expected, e.g., the *last* event in a story following the word *finally*, or the *cause* following the word *because*.

Considering the varied background of students' experiences, and thus their existing knowledge, and the lack of specific structural clues in text, drawing conclusions would seem to be a difficult comprehension skill. While many students in the intermediate grades do not show competency in this skill, more seem to be able to draw conclusions than understand the main idea and details and cause-and-effect relationships, at least according to a survey of essential literacy skills that was administered to 36,864 students. Understanding sequential information and drawing conclusions were about equally difficult for these students. Since only two items on the survey assessed skill in drawing conlcusions, it is not possible to determine with assurance which variable(s) accounts for the levels of difficulty; however, a closer look at the items may provide some insight into fruitful areas for further investigation.

A breakdown of scores indicates that the first item, which depicts a situation that most intermediate-grade students have probably experienced or observed either directly or vicariously (e.g., through television cartoons, books, etc.), is somewhat easier than the second, which expresses a less-familiar situation in a less-familiar textual format (a letter).

Item	Number of students = 36,864 % students answering each item correctly
1. Answers inference question about paragraph	80
2. Answers inference question about paragraph	75

Consider that both items are rich in details that are arranged in a sequence that gathers momentum. For example, in the first item the sequence is strictly forward with no temporal intrusions. There is also a partial description of the conclusion as *sudden* and *awful*. In the second item, the literary structure may be a familiar one in that a dilemma is expressed initially with the gradual revelation that a remedy is available. Within this letter there are numerous references to help the reader see the emerging solution, such as *sorry, not able to find work, good news, excellent, just the right partner, please come, see you soon.* Both items follow.

---

1. Jim left his skates on the front steps when he went inside the house. As he walked in, Sylvia walked out the front door. She didn't see the skates. All of a sudden, something awful happened.

WHAT DO YOU THINK HAPPENED?

- ○ Sylvia saw Jim outside.
- ○ Sylvia tripped on the skates and fell.
- ○ Sylvia walked up the front steps.
- ○ Sylvia opened the front door.

2. *Henry wrote to his friend, Carlos. Read his letter. Then answer the question.*

Dear Carlos,

Thank you for your letter. I was sorry to hear that you had not been able to find work in Campos. I was glad to read that you would like to work in the mines. I do have some good news for you because I have staked out a gold mine. It is an excellent mine. I have already found a lot of gold there. I need a partner because I can't do all the work by myself. You would be just the right partner for me. Please come and join me as soon as you can.

See you soon,

Henry

WHAT DO YOU THINK WILL HAPPEN?

- ○ Carlos will come to Henry's new mine.
- ○ Henry will go to Campos.
- ○ Henry will stop mining.
- ○ Carlos will stay in Campos.

There is a wide variety of activities that are intended to teach students how to draw logical conclusions from what they read. Some activities that are included in major series of reading texts and resource books merely provide practice in making inferences or drawing conclusions. Other activities present specific instructional strategies for the skill area. Activities can be classified according to their emphasis; areas of emphasis include the following: supporting facts, identification or statement of conclusions, testing and evaluation of conclusions, and generalizations. Some exercises include activities that fit into more than one area, for example, finding facts to support a conclusion and then identifying or stating that conclusion.

Some reading series provide guidance in developing an understanding that facts support a logical conclusion. There are also exercises that focus the reader's attention on the relevant facts of a particular selection, including those that lead to a conclusion about a character. Many exercises require the identification or statement of a conclusion *first* and *then* the identification or statement of supporting facts, a practice which may be backwards of an effective learning sequence. One series emphasizes the role of key words in drawing a logical conclusion.

The second area of instructional strategies centers on practice exercises. Typically students are presented with reading selections and are required to identify a logical conclusion among alternatives, or supply a conclusion, usually in response to a specific question, such as:

> The author appreciated the training in concentration that the school gave her.
>
> What does this tell you about the author?

Some exercises require the student to predict an outcome from an illustration, or to foretell the gist of a story. Occasionally a reading series will include some guidance in understanding what it means to "draw a conclusion" and then will provide practice in supplying an appropriate conclusion.

Another area includes activities that suggest that readers test or suggest a means of testing or evaluating conclusions based on the reader's existing knowledge and/or the facts of the text. Some of these activities also include practice in identifying or stating a conclusion. Some require the reader to support their evaluation of a conclusion.

The last area of instructional strategies is generalizations, a special instance of conclusions. The skill of making generalizations is not taught as a distinct skill in most reading series but is included here on account of its importance in the comprehension of intermediate- and upper-grade reading materials, especially in the content areas. Activities for generalizations include instruction in what a generalization is and in recognizing qualifying words for the identification of an appropriate generalization.

Performance specifications and sample activities for instruction in drawing conclusions are provided elsewhere (Escoe, Note 2). These activities have suggested a series of specifications for diagnostic items and samples of items. These items, which are supported by a model of information processing, are presented on the following pages.

Performance Specifications for Items to Diagnose Skill in Drawing Conclusions from Written Materials

Information about how a student processes written information when she or he attempts to draw conclusions becomes essential especially if that student is unsuccessful in this area of reading comprehension. Teachers have the responsibility of locating breakdowns or gaps in processing, so that students can receive specific instruction which will allow them to achieve at least minimal proficiency in their comprehension of written materials. A model of processing for drawing logical conclusions is projected here. The model assumes various aspects of a reader's prior knowledge, including: 1) familiarity with the content of text, through direct experience and/or vicarious situations such as other reading, television, movies, etc.; 2) familiarity with a variety of literary forms, such as fantasy, articles, poetry, and drama; 3) awareness of sources of details that can support a conclusion, such as a character's actions, thoughts, and words; and 4) familiarity with the more common types of qualifying words (for stating or identifying a generalization).

A student's lack of familiarity with the content of a particular unit of written language may be more important in considering problems in skill mastery than instructional materials and assessments usually suggest. Often the primary reason students are unsuccessful in drawing logical conclusions is that what they're asked to read about is foreign to them. No completely adequate means currently exists for teachers to assess a student's prior knowledge; however, teachers can determine how familiar students are with the content of a particular unit of text by asking questions. Consider, for example, the following selection:

When Enrique came to the front door, there were no lights on in his house. He couldn't understand why nobody in his family was home on this night, his twenty-first birthday. He put his key in the door, but the door wasn't locked. He walked into the living room to turn on the light switch. All of a sudden, the lights went on and Enrique saw his mother and brothers and sisters and all his friends. All together they screamed, "Surprise!"

Teachers can ask questions such as the following:

Why are birthdays usually fun?

What happens when a person has a birthday party but doesn't know about the party?

The second aspect of prior knowledge may be easier to assess. For one, teachers may already know with which forms of text a student has had some experience. Teachers would probably know if students have read or have listened to works of fiction, articles, etc. Secondly, specific questions can supplement a teacher's knowledge of a student's familiarity with literary forms. For example, a student may be given a selection and asked whether it is a play, fable, biography, letter, and so on.

A student's awareness of sources of details that can support a conclusion can also be evaluated by specific questions. A teacher can present a selection that lends itself to drawing a conclusion from a variety of detail sources, and then can ask the student to identify the sources, for example:

Susie knocked over a glass of milk. "Good grief," she thought to herself, "this is the third time I spilled something today! I should be more careful." After cleaning up the mess, Susie walked into the living room and tripped on the edge of the rug. She bumped her head against the lamp, and it broke on the floor. When her sister came home, Susie told her, "Janie, I don't think I'll take another step. If I do, I'll just knock over something else."

What did Susie *do* that tells you she is clumsy?

_____

_____

_____

What did Susie *think* after she knocked over the milk?

_____

_____

_____

What did Susie *say* that lets you know that she thinks she is clumsy?

_____

_____

_____

The fourth aspect of prior knowledge that can be evaluated is an awareness of the more common types of qualifying words used in generalizations, such as *most, all, every, some, many* and *always*. Often this awareness is especially useful to the reader when she or he needs to respond to a practice exercise or test item. Consider the generalization and questions below:

The color of most soil is brown.
Can soil be gray?

The process of drawing a logical conclusion from written materials appears to go something like this: the student--

- 1. reads a selection from which a conclusion can be drawn;
- 2. identifies details;

- 3. tentatively draws a conclusion;
- 4. tests the tentative conclusion against details and confirms that it is supported by textual details and makes sense according to [the reader's] general knowledge of content and structure;
- (5. predicts an outcome);
- (6. identifies common questions that require conclusion-responding);
- (7. identifies word qualifiers [words which specify or limit boundaries of generalizations]);
- (8. tests the tentative generalization against qualifiers and details, and confirms that it makes sense according to the reader's general knowledge of content and structure).

Step 6 of the model described above applies primarily to practice exercises or assessment items. For success with these materials, readers may be assisted in their response to questions if they are able to recognize a question as one which requires a conclusion to be drawn. For example, a reader should be able to determine whether or not a question can be answered on the basis of explicitly-expressed information or whether inference is required. Sometimes exercises and assessment items provide clues, such as ". . . do you think . . .?" Some examples of clued questions are:

> What do you think Andy will do after Kenny goes home?
>
> How do you think Sara felt when her mother brought along the old coat?
>
> Do you think the colt will try to find the Bar X ranch?

Endings to be supplied by the reader also fall into this category, for example:

> Finish the last paragraph.
>
> Write an ending for this story.
>
> Tell what will happen next in the story.

When students are asked to make a generalization, additional processing steps may be involved. Assuming that a generalization is a subsumption of a conclusion, all the processing described for conclusions should be applicable to generalizations. In addition, understanding of generalizations may require processing of word qualifiers. Consider the case where a reader is asked to identify an answer choice that is a generalization. The choice is likely to include a qualifier such as *all, never, some, many,* and so on. A student should then be able to identify the qualifier, to understand its function, and to confirm or deny a chosen generalization in terms of the qualifier as well as in terms of question recognition, textual details, and the reader's general knowledge.

Sample items. Assuming processing occurs as it is sketched above, items such as the following can be developed to determine where the student has or has not achieved proficiency.*

- 1. Reads a selection from which a conclusion can be drawn.
- 2. Identifies details.

*Items can be developed for either oral or written presentation and response, and with various performance modes such as multiple-choice, completion, open-response question.

Performance specifications: Given a selection from which a conclusion can be drawn, identify details.

Example:

> Claudia and her little brother saw the big sign outside. It said *THE BIG SKY* starring Roger Santos and Paul Dean. Claudia waited in line to buy tickets. Finally she and her brother gave their tickets to the lady at the door. They walked inside the huge doors and found two empty seats.

What did Claudia and her brother see outside?

A a seat
B an automobile
C a sign

What was Claudia waiting to buy?

A tickets
B books
C candy

• 3. Tentatively draws a conclusion.

Performance specifications: Given a selection, identify an appropriate conclusion.

Example:

(Refer to 2 above.)

Where do you think Claudia and her brother went?

A to the candy store
B to a bookstore
C to a movie

• 4. Tests the conclusion against the details and confirms that it makes sense.

Performance specifications: Given a selection from which a conclusion can be drawn, respond to a question that requires application of prior knowledge and content.

Examples:

(Refer to 2 above.)

What information in the paragraph helps you to think that Claudia and her brother went to [answer choice for #3 above]?

_____

_____

_____

Think about going to a movie. Read each question and draw a circle around yes or no for your answer.

Does it make sense to see a big sign outside a movie?

Yes No

Does it make sense to see a title and the names of stars on the sign?

Yes No

Does it make sense to buy tickets for a movie?

Yes No

• (5. Predicts an outcome.)

Performance specifications: Given a selection from which a conclusion can be drawn, identify a logical outcome.

Example:

(Refer to 2 above.)

Finish the paragraph.

A Then the lights were turned down.
B Then Claudia read a book.
C Then Claudia bought two tickets.

• (6. Identifies common questions that require conclusion-responding.)

Performance specifications: Given a selection from which a conclusion can be drawn, identify a common question that requires conclusion-responding.

Examples:

(Refer to 2 above.)

Read the following questions. Think about whether the paragraph states the answer or whether you have to draw a conclusion for the answer.

Write A next to each question if the answer is stated in the paragraph. Write B if you need to draw a conclusion from the information in the paragraph.

A. The answer is stated in the paragraph.

B. I need to draw a conclusion from the information in the paragraph.

_____ Where do you think Claudia and her brother went?

_____ Who were the stars of *THE BIG SKY*?

_____ Did Claudia wait in line?

_____ What do you think Claudia and her brother did when they found the empty seats?

_____ What happened after they found the empty seats?

• (7. Identifies word qualifiers.)

Performance specifications: Given a conclusion, identify a word qualifier.

Example:

Some words give you extra information about a conclusion. These words usually tell you how many or how much.

Look at the following conclusion. The circled word gives you extra information.

The history of most old cities is interesting.

Read each conclusion. Draw a circle around the word that tells you how many or how much about the conclusion.

Every living plant needs water.

Lions roam wild in some parts of the world.

• (8. Tests the generalization against qualifiers and details and confirms that it makes sense.)

Performance specifications: Given a selection and a generalization, respond to a question that requires application of prior knowledge and content.

Example:

Read the following paragraph. Then look at the sentences. Answer the questions.

Water is the most common thing on our earth. If there was no water, there wouldn't be any life. Every living things needs water to keep it alive. Plants need it, and so do animals, including people.

Every living plant needs water.

What would happen if there was no water?

_____

_____

What does every living thing need to keep it alive?

_____

_____

Is a living plant a living thing?

A yes
B no

Which statement is true? Which is false?

	True	False
No living plant needs water.	___	___
Some living plants need water.	___	___
Many living plants need water.	___	___
Most living plants need water.	___	___
Every living plant needs water.	___	___

What would happen if your plant didn't get any water for a long time?

_____

_____

FROM INSTRUCTIONAL PRACTICE TO A MODEL OF READING COMPREHENSION

This paper has focused on four areas of skill development in reading comprehension commonly taught and assessed as part of reading curricula in the intermediate grades (understanding the main idea, sequence, cause-and-effect relations, and drawing conclusions). We systematically analyzed instruction to be able to explain what individuals do when they read, the results being the strategies described in this paper. We also wanted to observe the results of instruction, that is, what intermediate-grade students *can* do when they read. Here we examined the data from the administration of curriculum-based surveys of proficiency in reading to large numbers of students. Our observations of instruction and assessment were translated into sequential procedures that teachers can use to diagnose students' development of reading comprehension skills. These diagnostic procedures have been specified here for each of the four skill areas. The same observations also suggest a model of reading comprehension that researchers can test by attending to reading instruction *in the classroom.*

Textbooks and other materials that comprise reading curriculum document what students are taught and, by implication, what they are expected to do when they read. In other words, an analysis of practice provided in instruction was one way to know where to begin to look at what happens when individuals are taught to read. By and large, practice in the intermediate grades specifies that individuals understand the central theme of writing (main idea), see conceptual relationships such as sequential and causal ones, and interpret information that is not stated explicity (draw conclusions).

The picture that emerged from looking at assessment was a complex one. Even though text items were not selected to discriminate between students through deceptive or tricky means and reflected the sort of tasks routinely met by students during instruction, the range of proficiency in comprehension was great--and also puzzling. The data were not consistent with those arising from responses to the decoding (word analysis) items (including structural analysis) on the same surveys. When intermediate-grade students responded to items that assessed their proficiency in analyzing words both phonetically and structurally their scores were much higher.

If we look again to instruction we notice that activities in decoding reflect the technical nature of this group of skills--generally they are ordered in a fairly rigid step-by-step "packaged" progression. Instruction in decoding begins with a few mostly regular sound-symbol correspondences and later to the highly irregular correspondences. Little or no instruction in decoding is based upon what students already know (even letter names are taught in conjunction with decoding activities in the earlier grades; it is not assumed that students bring this prior knowledge to school). Practice in decoding is provided over and over throughout the reading curriculum, and in the early grades especially is preceded by direct instruction. By contrast, when we look at instruction in reading comprehension, we see activities that depend greatly on what students already know, in other words what they bring to the task. Success in understanding the main idea, for example, is highly dependent not only on a student's familiarity with both the content and structure of the written passage, but also with the knowledge that understanding a passage

depends on information *outside* the written text. We also note that practice in reading comprehension is very limited through the grades. Where practice is provided, moreover, it is not usually accompanied by direct instruction. Instead practice is hardly more than a stimulus-response situation, an exercise where *some* students show prior knowledge of content and structure, and knowledge that prior information must be accessed for comprehension of what they read. This knowledge is not imparted by direct instruction. Across reading textbook series and supplementary instructional materials we see very little acknowledgement of a model of reading that recognizes the factor of students' prior knowledge. In fact, most instructional activities do not appear to be presented in accordance with *any* theoretical base, save some nonspecific elements of learning theory, e.g., positive reinforcement of correct responses to exercises, spaced review, and others.

If we combine the foregoing observations of instruction and performance with an intuitive way of thinking about what we as proficient readers do when we understand written text, there are some general implications that stand out, more or less, as inductive beginnings for researchers to engage in model building in reading comprehension. From our analysis of skill instruction and attainment the implications go something like this:

i) reading is an information process that uses elements of both text and the reader's knowledge to produce comprehension;

ii) readers start to read with little information about the text but begin to gather information from it;

iii) readers access the knowledge stored in memory, knowledge gathered from prior situations, either direct or vicarious such as through print, and guess about the meaning expressed by the text;

iv) readers then test their hypotheses against the written information and verify or modify them.

If we look again at the four areas of instruction in reading comprehension, we can see the roots of these implications very clearly.

Main Idea, Details

Let's consider the skill area of main idea first. A fifth-grader, for example, reads an expository paragraph such as the following:

> *Found in most states east of the Rocky Mountains, the woodchuck can easily get its favorite vegetables in the open fields. The furry woodchuck will stand very straight and look like a tree trunk whenever it wants to hide from humans. Even if a farmer builds a fence, the woodchuck will climb over it. If there is a very high fence, the woodchuck will dig under it. It's no wonder that farmers call this smart little animal one of the biggest troublemakers in America.*

Especially if the reader has never seen or read about woodchucks (which is quite possible if the student has never traveled east of the Rocky Mountains) she or he approaches the text with little prior knowledge of woodchucks. However the structure of the opening sentence ("Found in _____, the _____ . . .) may energize the reader's familiarity with encyclopedia entries for flora and fauna. Reading further, the student confirms that the text is presenting a description of an animal. The proficient reader *expects* to see in print more information about this animal, probably anticipating to read about its looks, its eating habits, its living habits, or its uses for food or clothing. The reader may also be familiar with the activities of clever creatures in general. Perhaps she or he has read similar paragraphs in an instructional workbook or duplicated sheet. Perhaps the student

has seen a documentary film at a nature center or park or museum. These are all bits of information that may not be apparent from the particular situation. On the other hand, the fact that woodchucks are found east of Rocky Mountains may be irrelevant to another, larger concept that is accounted for by several ideas--that larger concept can be the main idea, which may be stated in this example as *The woodchuck is a smart animal.*

The fitness of an information processing model for explaining how readers understand main ideas becomes especially apparent when one considers the structural organization of concepts presented by text. Adams and Collins (1977) describe a particular class of concepts that is composed of a hierarchy of networks of interrelationships among components of a situation, in this case the details. They refer to these networks as "schemata" (singular, "schema"). At the top of the hierarchy is a general representation that holds the essential aspects of all members of the class. Using Schank and Abelson's (1975) example, the schema that represents "going to a restaurant" could be at the top level. This schema would include such information as a restaurant is a commercial establishment where people pay to have someone else prepare their food and clean up after them. Beneath this general concept, there are more specific schemata, such as going to a diner, a fast-food place, or an elegant restaurant. At the lowest level, schemata apply to unique occurrences. According to this model, the comprehension of a story (or other unit of text) involves a process of binding the details of the text to parts of a schema that the reader already has. Using the previous example, if there is a nervous person in the story who takes an order in the restaurant, she or he will be bound to the role of waitress or waiter. If the person then knocks over a glass of water, this detail will be matched against the nervous quality of the person who is bound to the waitress or

waiter's role. Translated to the situation where a reader attempts to understand the main idea of a passage about the restaurant, she or he recognizes details including the actions of the waitress or waiter hypothesizes a general concept that is supported by the details (perhaps that this is the waitress/waiter's first day on the job), tests this concept against the details, and either confirms the concept (main idea) or modifies it. In other words, according to schema theory, understanding the main idea seems to involve the integration of details into a general concept by way of expectations that the reader brings to the text.

What this model of information processing can recommend to the teacher who is responsible for helping students to derive the main idea of written materials is this: by helping students to acquire broader knowledge through direct experience, the teacher may also be helping them use schemata to understand the gist of what they read. These conceptual bases also suggest that teachers alert students to the existence of relevant schemata for various types of written materials (e.g., encyclopedia entries, articles, narrative stories), and that the generalizable structure of these materials is useful in comprehending the main idea.

An additional application of this model to the skill area of main idea and details concerns the comprehension and recall of details in written materials. According to schema theory, remembering and noting details is helpful to the reader only to the extent that the details focus on information that is useful in changing or integrating existing schemata (Strange, 1980).[7] Another way of looking at this idea is that attending to details which support a summary concept or main idea, i.e., relevant details, becomes a productive comprehension activity for the reader. Relevant

details are those that modify or are accommodated by schemata; other details may serve peripheral purposes. What this means for instruction is that activities should focus on details only in so far as they support main ideas.

The foregoing theoretical basis for understanding main idea suggest how proficient readers process main idea and details in written materials. It appears that a reader comprehends the central message by bringing to the text prior knowledge and recognizing structure and content (details) of the materials, both of which energize available schemata. The proficient reader, it is theorized, compares expectancies or predictions of information with textual data and either verifies or modifies appropriate schemata. This process of comparison, in more familiar instructional terms, is in effect one of making inferences about the materials and then drawing conclusions.

Sequence

Schema theory seems to "work" within the area of sequence as well as main idea. In the case of written sequential information, a schema for the particular structure of the textual form (e.g., a recipe for food preparation) joined by schemata that are shaped from familiar content (e.g., cold fruit salads) can lead the proficient reader to *expect* to see certain sorts of information in print in a particular order. It is only when these things are *not* met upon reading the text further, that readers must attend rather closely to details of structure and/or content, and then, likely, revise their schemata. Consider the example of text below.

Nutty Apple Salad

1/4 cup nuts	*1/4 tsp. lemon juice*
1/2 cup celery	*1/2 cup salad dressing*
1/2 cup dates	*1/4 cup whipping cream, whipped*
2 Granny apples	

Chop nuts, celery and dates and put into a large bowl. Core and chop apples and add to mixture in the bowl. Mix lemon juice with salad dressing. Fold whipping cream into dressing. Add dressing to fruit mixture and stir until everthing is evenly coated. Serve immediately or chill until ready to use. Serves 4-6.

Suppose, for example, that the text first specified the directions for mixing the ingredients and then listed the ingredients. It's a reasonable guess that proficient readers would be confused initially, and would have difficult comprehending the text at first. Readers would *expect* to see ingredients listed first in their schema for recipes. There are also word clues that indicate sequence. "Add to mixture in the bowl" presupposes that something was put in the bowl *first*. Readers familiar with this sort of expression will bring to print a schema for this information, which will involve an understanding of the sequence of handling ingredients. Clue words for sequence in other forms of text work in a similar way. Consider the function of words such as *first, next, last, after,* and *then* in a narrative passages. Prior knowledge of content also allows other schemata to be brought to print. Using the example above, readers who have prepared, watched the preparation of, and/or read about the preparation of other cold salads would probably expect to read that pouring dressing comes later in the procedures. Similarly, in some narrative materials, the villain appears or is merely mentioned early, and is shown attempting

to inflict damage later. Students who read other stories of the same sort will bring to the new texts a schema based on the old.

Cause and Effect

Similar to the skill areas of main idea and details, and sequence, proficient processing of cause-and-effect relations in print can be explained by schema theory. First, causal relations are complex (Cronnell, Note 3), and often can be understood only with inferences made by the reader. (Even where cause-and-effect relations are stated by means of markers, for example, *I won the blue ribbon* because *I practiced every day*, readers must be able to recognize the causal marker, know its function in the particular context, and identify its referents in order to understand the relations expressed by the statement.) Where cause-and-effect relations are not revealed by a marker, which is often the case for intermediate-grade readers, the relations must be inferred, for example, *I practiced every day and won the blue ribbon.* The inferred relations are not just additional information to be stored and accessed, but are often conceptual representations, schemata if you will, which seem to be built during reading and assimilated into existing schemes (Paris & Upton, 1976). The basis for a successful inference seems to be a set of "suspended causality" rules, a set of propositions that specify what kinds of events commonly cause other events (Pearson & Johnson, 1978). So what we seem to have is an interaction between expectancies of content and structure, which are based on prior knowledge, and the verification or modification of these expectancies that is provided by the specific instance of text.

Schema theory is also associated with cause-and-effect relations in the case of passages in which the structure is causal, those units of text that enable a reader to understand a central theme or main idea when supporting details are in fact causes or effects. Consider this example of a paragraph whose main idea is unstated but assumes the role of an effect, *I passed the test,* and whose details provide causes:

> *I went to every class and took extensive notes. I read all the assignments and studied very hard. In fact, I stayed up all night on the night before the exam.*
>
> (Cronnell, Note 3)

Needless to say, the facilitative effect of the causal structure upon comprehension of the main idea rests with the reader's recognition of that structure. A reciprocal effect may be that the comprehension of the main idea based on the processing of details may support the reader's understanding of the cause-and-effect structure suggested by the text.

The interactive nature of schema theory suggests a third example of the fitness of the theory in accommodating cause-and-effect relations in the comprehension of written matter. In an analysis of other reading comprehension skills we described the impartation of meaning to words according to a model of information processing. It was suggested that a reader attends to a word and its features, hypothesizes about its meaning by accessing prior knowledge and contextual information, selects appropriate schemata for the word as used in the given context, and confirms a meaning for the word, perhaps adding to or modifying exisiting schemata. The contextual clues that may be derived from a cause-and-effect pattern of text organization can assist the reader in selecting appropriate schemata for a word, and thus meaning for that word (Ames, 1966; Quealy, 1969).

Specifically, the effect (in an effect-to-cause structure) or cause (in a cause-to-effect structure) may partially clarify the meaning of an unfamiliar word that is embedded in the portion of a unit of text that expresses the opposite relation (Humes, 1978), for example:

1. I passed the test because I studied *diligently.* (effect-to-cause)

2. I studied hard, so I passed the *examination.* (cause-to-effect)

Drawing Conclusions

Let us now consider the fourth skill area of reading comprehension--drawing conclusions. Similar to the other skills discussed in this paper (understanding main idea and details, sequence, cause-and-effect), drawing logical conclusions from text seems to require the recognition of textual data, the modification or reconciliation of this information with readers' own experiences and knowledge, and then the inference or prediction of what is not explicitly stated--essentially specifications of schema theory. Proceeding along these lines, drawing conclusions usually involves focusing only on those details that contribute to the schemata called for, in this case those schemata that assist the reader in making an inference. In other words, being able to draw logical conclusions from text requires that the reader be able to select relevant facts or details.

Summary

Each of the foregoing observations of the major skills of reading comprehension supports a model of information processing, and can in turn be explained by it. Further, if we return to the diagnostic sequences of

constituent skills suggested in this paper for each major skill, we can see how each sequence corresponds to the process of comprehending what is read as outlined by the model. Except for special considerations, such as demonstrating reading comprehension through multiple-choice test items and performing a function in response to reading directions, the diagnostic sequences are basically *identical* to the processes spelled out by schema theory. This close fit of instruction to theory should provide some direction toward improved instructional and diagnostic strategies. Clearly, at this point, classroom instruction has more to offer the model building process than the other way around. The direction of this relationship is quite the opposite of what is commonly held these days, which is that existing schooling waits to take shape from newly created models. Where these models come from is anybody's guess, but a compelling argument from the analysis presented here is that the natural phenomena of the classroom--instruction and assessment--offer researchers a valid and powerful tool of inquiry into the process of reading comprehension, or how reading *really* happens.

Reference Notes

1. Flege-Kollmann, L. A profile of reading instruction (TN 3-79-22). Los Alamitos, CA: Southwest Regional Laboratory for Educational Research and Development, November, 1979.

2. Escoe, A. S. A systematic analysis of instruction in reading comprehension in the intermediate grades: Main idea, details; sequence; cause and effect; drawing conclusions (TN 2-81/06). Los Alamitos, CA: Southwest Regional Laboratory for Educational Research and Development, March, 1981.

3. Cronnell, B. Cause and effect: An overview (TN 3-79-16). Los Alamitos, CA: Southwest Regional Laboratory for Educational Research and Development, October, 1979.

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Footnotes

[1]This paper is based in part upon a Technical Note by the author: A systematic analysis of instruction in reading comprehension in the intermediate grades: Main idea, details; sequence; cause and effect; drawing conclusions (TN 2-81/06). Los Alamitos, CA: Southwest Regional Laboratory for Educational Research and Development, March 1981.

[2]Los Angeles Unified School District Survey of Progress in Essential Skills (Grade 5, 1979): .13; McGraw-Hill Comprehensive Tests of Basic Skills (Level 2 Form S, 1973): .11; SWRL Proficiency Verification Systems (Benchmark, End of year, Grade 5, 1979): .12; Sacramento City Unified School District Proficiency Survey (Grade 5, 1979): .10.

[3]Durkin assumed a definition of comprehension that does not include practice exercises: "Teacher does/says something to help children understand or work out the meaning of more than a single, isolated word." (p. 488)

[4]Following are the percentages of sequence items among all items in the reading comprehension sections of four instruments administered to substantial numbers of California school children: Los Angeles Unified School District Survey of Progress in Essential Skills (Grade 5, 1979): .22; McGraw-Hill Comprehensive Tests of Basic Skills (Level 2 Form S, 1973): .09; SWRL Proficiency Verification Systems (Benchmark, End of year, Grade 5, 1979): .12; Sacramento City Unified School District Proficiency Survey (Grade 5, 1979): .20.

[5]Los Angeles Unified School District Survey of Progress in Essential Skills (Grade 5, 1980): .17; McGraw-Hill Comprehensive Tests of Basic Skills (Level 2 Form S, 1973): .07; SWRL Proficiency Verification Systems (Benchmark, End of year, Grade 5, 1979): .08; Sacramento City Unified School District Proficiency Survey (Grade 5, 1979): .10.

[6]Following are the percentages of drawing conclusions items among all items in the reading comprehension sections of four instruments administered to substantial numbers of California school children: Los Angeles Unified School District Survey of Progress in Essential Skills (Grade 5, 1979): .11; McGraw-Hill Comprehensive Tests of Basic Skills (Level 2 Form S, 1973): .18; SWRL Proficiency Verification Systems (Benchmark, End of year, Grade 5, 1979): .16; Sacramento City Unified School District Proficiency Survey (Grade 5, 1979): .10.

[7]This notion may not apply to certain kinds of reading (e.g., recipes) or reading purposes (e.g., scanning an encyclopedia entry to find a former president's birthplace).